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Research Article

Diversity of microphytes from some reservoirs of Kolhapur district

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Abstract

Aquatic microphytes are pioneer organisms of an aquatic food chain. The productivity of an aquatic environment depends on the density of microphytes. These produce the food material on which other organisms in the ecosystem sustain. In this context, the present investigation was undertaken to study the diversity of microphytes from some reservoirs (Belawale Budruk, Benikare, Karanjivane, Sonali and Murgud) of Kolhapur District, Maharashtra. About 108 species of microphytes were identified from these lakes. Maximum diversity is observed from Chlorophyceae, followed by Bacillariophyceae and Cyanophyceae.

Keywords: Limnobotany; diversity; phytoplankton; Chlorophyceae

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Introduction

Microphytes are the small, tiny unicellular or multicellular planktonic alga observed in all aquatic ecosystems (fresh, estuarine and marine). They are grouped into filamentous algae and planktonic algae. The filamentous algae are uniseriate, forming long chain, thread or filament. These chains, threads and filaments are intertwined to form a mat which resembles with wet wool (1). They are commonly known as pond scum or algal blooms. However, planktonic algae or phytoplankton are microscopic, free floating plants unicellular or multicellular algae exist individually or in colony or in chain or groups (2). On the basis of species, their size can be ranging from a few micrometers (µm) to a hundred micrometers. They are commonly known as “green water algae or pea soap algae”. The phytoplankton are not having root, stem and leaves, but they are capable to perform the photosynthesis and produce approximately half of the atmospheric oxygen by using the carbon dioxide to grow photo autotrophically (3).

Most of the microphytes are small and numerous in natural waters, usually at the level of 10^2 to 10^6 cells/ml. This makes their study very convenient even with small volume of water. It is a convenient tool in ecological studies, which help to be valid, the biotic components of reservoirs as a

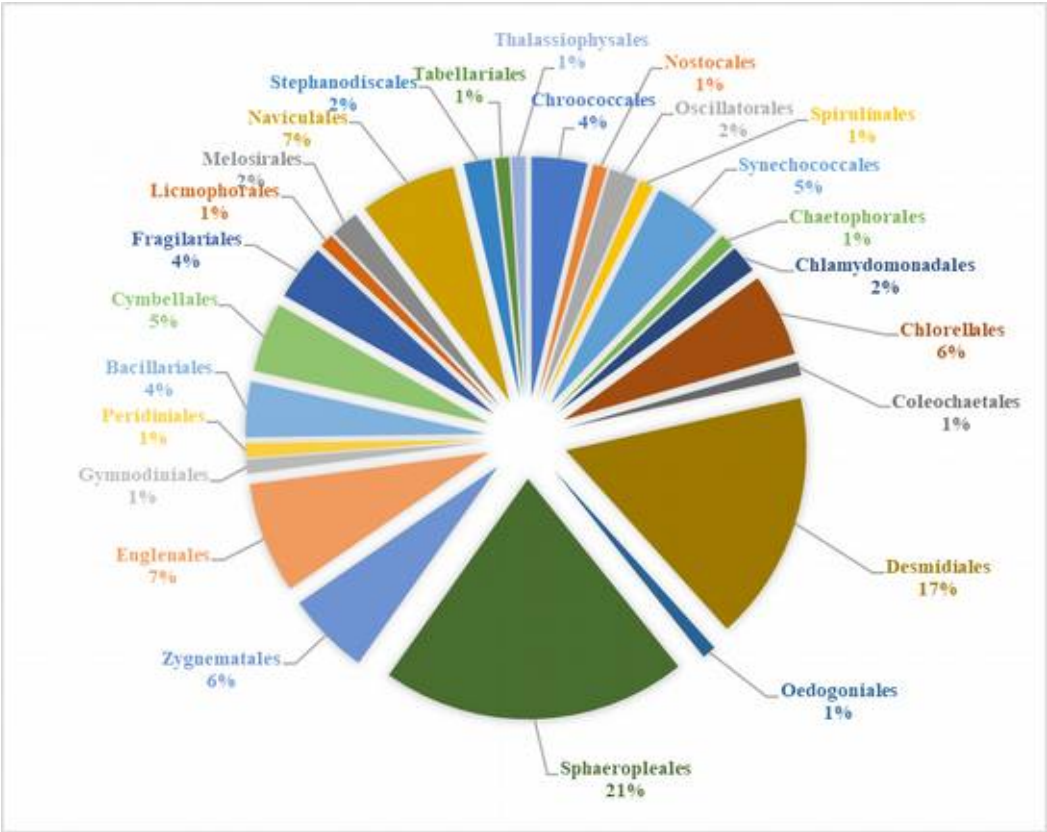

Fig. 1. Pie-Chart showing most specious order of microphytes in studied reservoirs of Kolhapur district

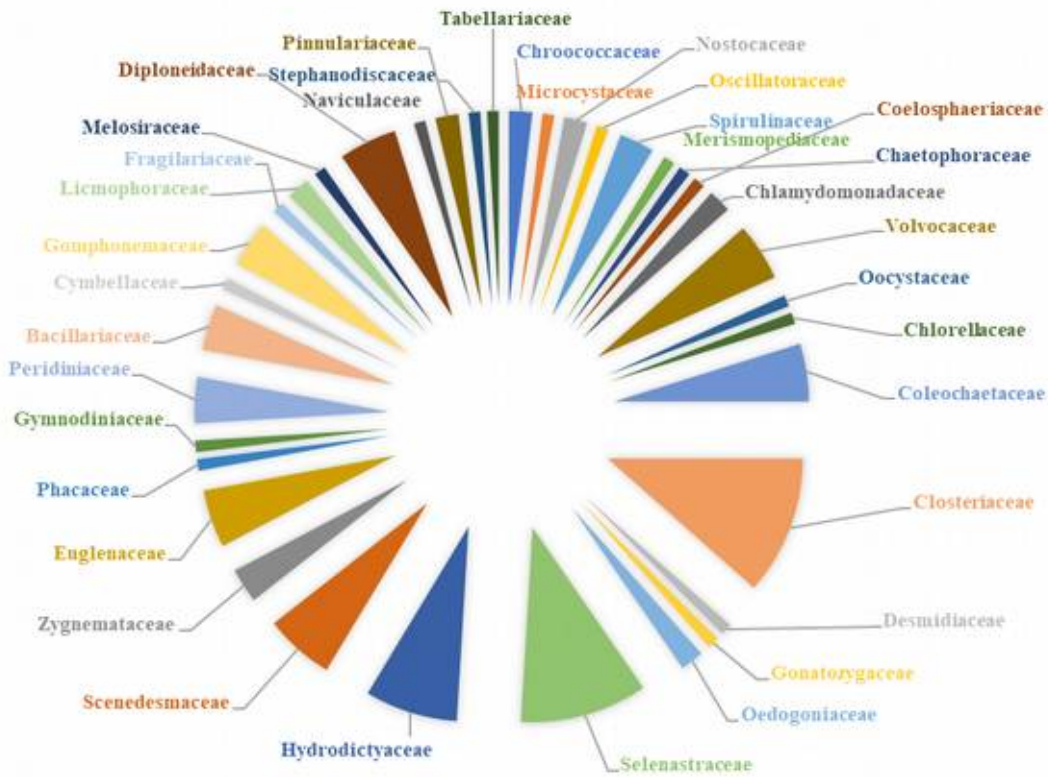

Fig. 2. Pie-Chart showing most specious family of microphytes in studied reservoirs of Kolhapur district

part of water pollution, investigations as well as in biological waste water treatment plants (4).

Now a days the quality of water bodies gets polluted due to an increase in human activities. Thus, it underlines to study the seasonal limnobotany with reference to microphytes diversity. The microphytes in water may exist in the forms like filamentous and planktonic forms. The limnobotanical study with special reference to algal diversity plays an important role to understand the status of water

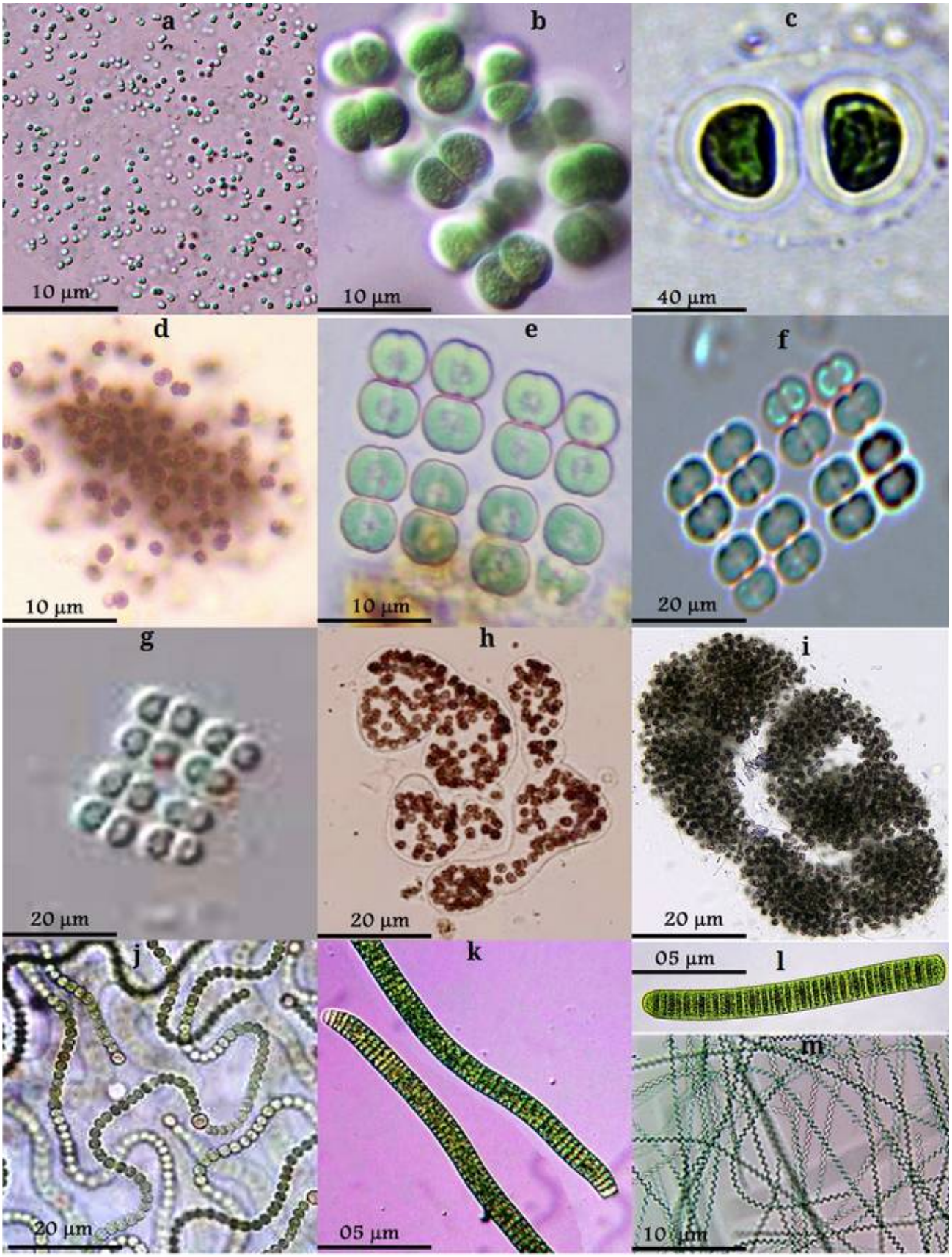

Fig. 3. a. *Aphanocapsa grevillea,* **b**.*Chroococcus limneticus,* **c**. *Chroococcus turgidus* **d.** *Coelosphaerium kuetzingianum*, **e.** *Merismopedia elegans* **f.** *Merismopedia glauca* **g.** *Merismopedia punctata,* **h.** *Microcystis aeruginosa,* **i.** *Microcystis incerta,* **j.** *Nostoc paludosum,* **k**. *Oscillatoria subbrevis,* **l.** *Oscillatoria tenuis*, **m.** *Spirullina nordstedtii*

bodies. The analysis of water samples to study the microphytes from reservoirs of Kolhapur district will help to conceptualize the extent of requirement and also help to know their status. To establish status report, limnobotanical investigation in terms of algal diversity has got prime importance. During present investigation diversity of microphytes in some reservoirs from Kolhapur district were studied.

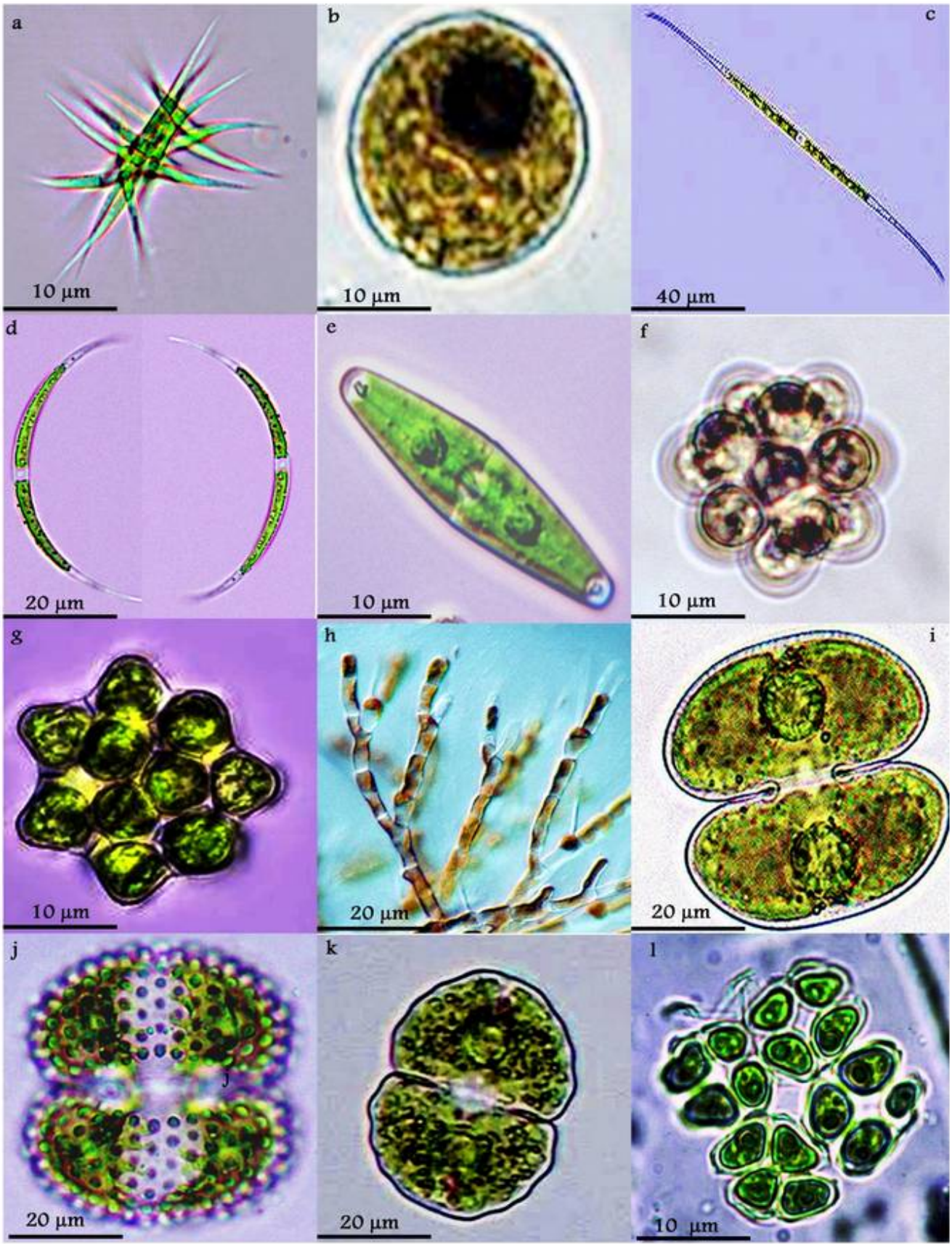

Fig. 4. a. *Ankistrodesmus fusiformis* **b.** *Chlamydomonas elegans* **c.** *Closterium aciculare* **d.** *Closterium acutum* **e**. *Closterium navicula* **f.** *Coelastrum microporum* **g.** *Coelastrum sphaericum*, **h.** *Coleochaete orbicularis*, **i.** *Cosmarium depressum*, **j.** *Cosmarium reniforme*, **k.** *Cosmarium undulatum*, **l.** *Crucigenia truncata*

Materials and Methods

The diversity of Microphytes from some reservoirs of Kolhapur district is studied (Satellite Map 1-5, images were taken from google earth). For the study of microphytes 100 litters of water were filtered through the nylon mesh (05-200 µm). Filtrate was collected in 100 ml prelabelled plastic bottles and fixed in 0.4%

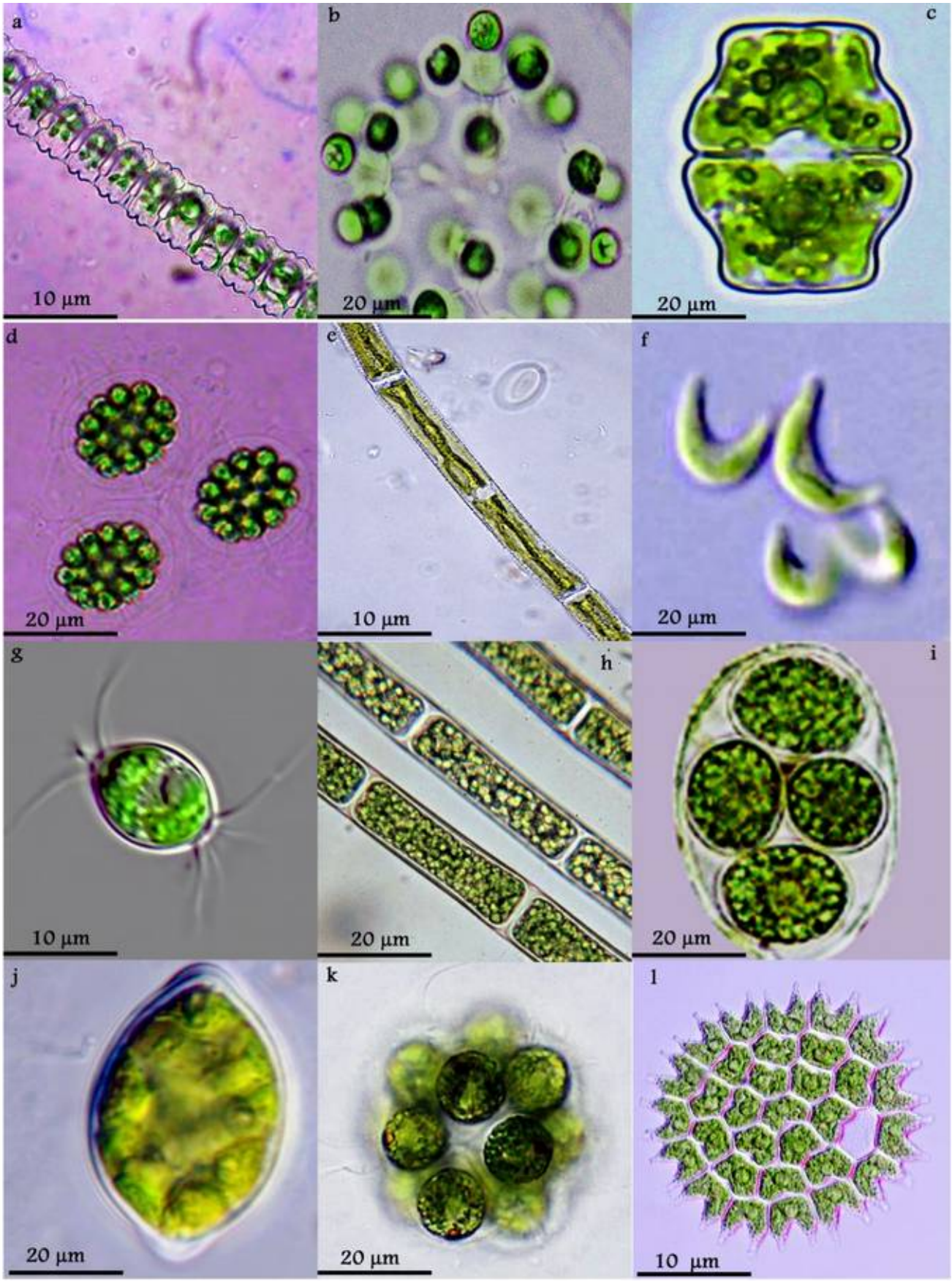

Fig. 5. a. *Desmidium swartzii,* **b.** *Dictyosphaerium pulchellum,* **c.** *Eustrum insulare*,**d.** *Eudorina elegans,* **e.** *Genicularia elegans,* **f.** *Kirchneriella lunaris,* **g.** *Lagerheimia quadriseta,* **h.** *Mougeotia scalaris,* **i.** *Oocystis gigas,* **j.** *Oocystis gloeocystiformis,* **k.** *Pandorina morum,* **l.** *Pediastrum duplex* var. *clathratum*

formalin. Preserved samples were studied after the proper settlement of the algal debris. The samples were examined under the microscope (LICA 2000) at 10 x, 40 x and 100 x depending upon the structure and size of the algal cells. The identification of various types of phytoplankton were done with help of different flora (5-13).

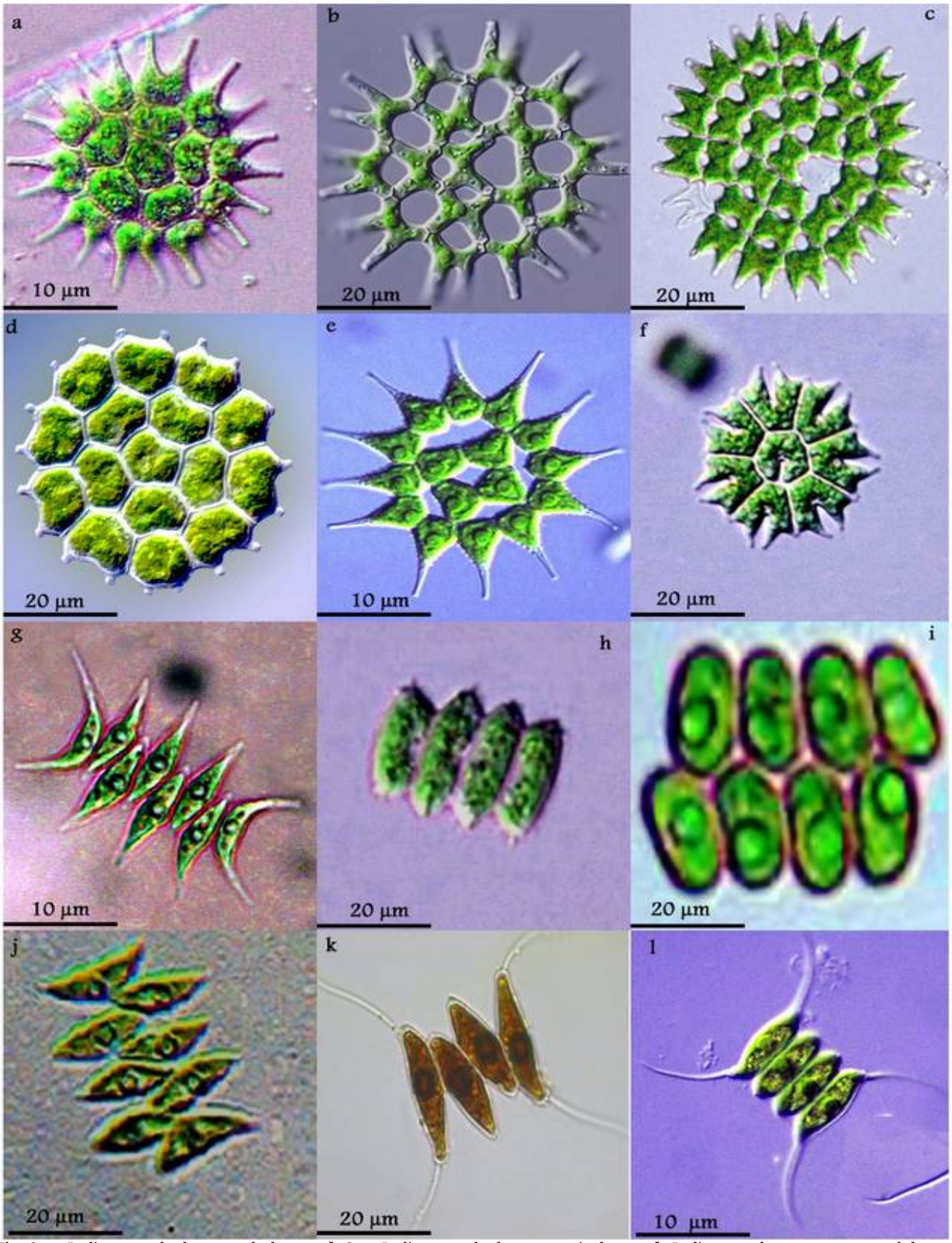

Fig. 6. a. *Pediastrum duplex* var. *clathratum* **b & c.** *Pediastrum duplex* var. *reticulatum*, **d.** *Pediastrum boryanum* var. *undulatum*, **e**. *Pediastrum simplex*, **f.** *Pediastrum tetras*, **g.** *Scenedesmus acuminatus*, **h.** *Scenedesmus bijugatus*, **i.** *Scenedesmus bijugatus* var. *irregularis*, **j.** *Scenedesmus dimorphus*, **k.** *Scenedesmus hytrix*, **l.** *Scenedesmus quadricauda*

Results

The concepts of periodicity, succession and response to environmental changes on diversity of phytoplankton attract the interest of many ecologists. (14, 15). Moreover, number and species of phytoplankton serves to determine the quality of water body. It was then the subsequent works were aimed at finding out the causative factors responsible for the growth and sustenance of groups of

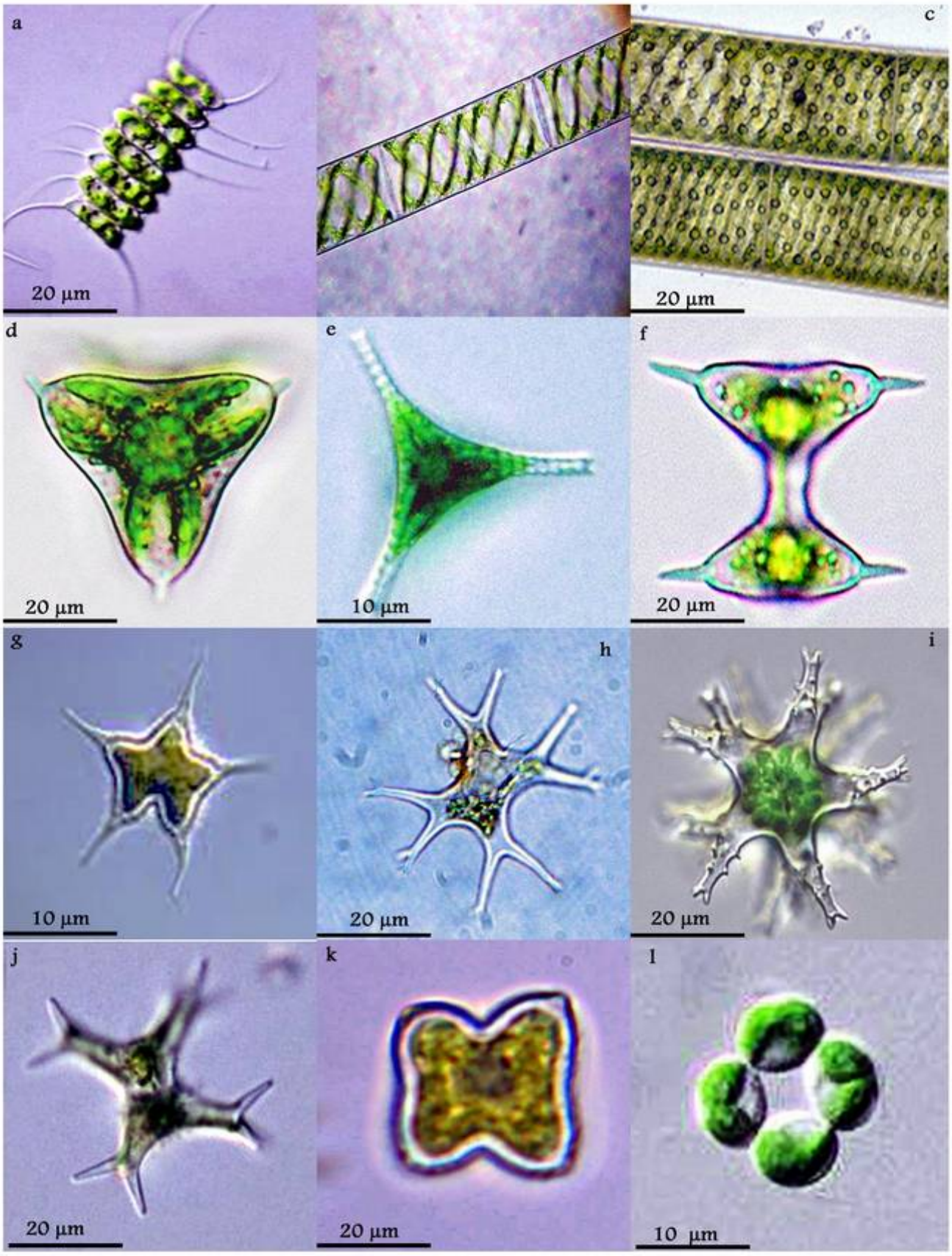

Fig. 7. a. *Scenedesmus quadricauda* var. *minutum*, **b.** *Spirogira condensata*, **c.** *Spirogyra crassa*, **d.** *Staurastrum dickie*, **e.** *Staurastrum dijuctum*, **f.** *Staurastrum glabrum* var. *depressum*, **g.** *Tetraedron caudatum*, **h.** *Tetraedron gracile*, **i.** *Tetraedron incus*, **j.** *Tetraedron limneticum*, **k.** *Tetraedron minimum*, **l.** *Tetrastrum triangulare*

phytoplankton or zooplankton (16). During the present investigation microphytes diversity was studied from reservoirs of Kolhapur district (Table 1 and Fig. 1-9). About 108 species belonging 36 families, 25 orders spread over 5 major class of algae were identified from studied reservoirs (Table 1).

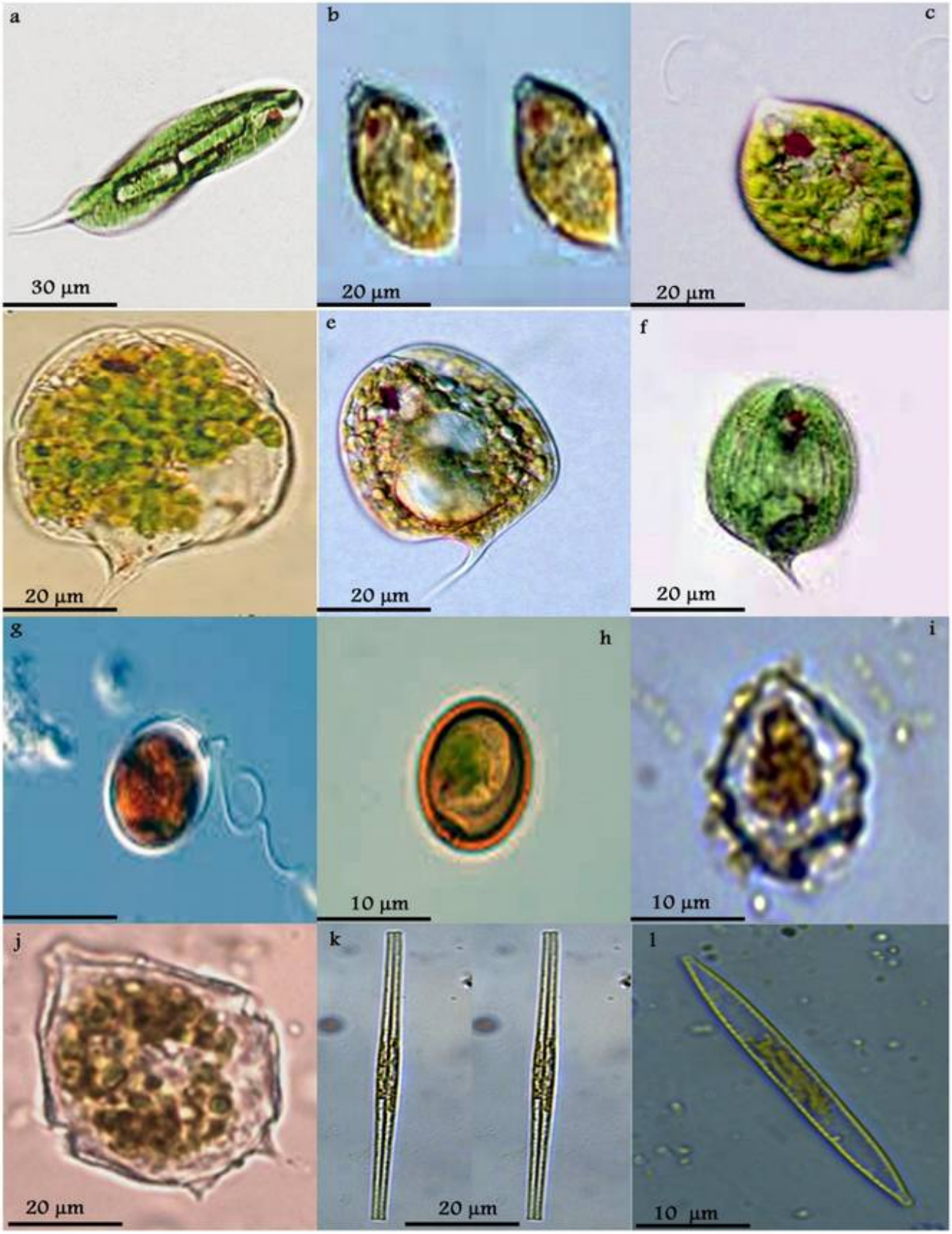

Fig. 8. a. *Euglena acus,* **b**. *Lepocinclis acuta,* **c**. *Lepocinclis fusiformis,* **d.** *Phacus acuminatus,* **e**. *Phacus anacoelus,* **f.** *Phacus curvicauda,* **g**. *Trachelomonas hispida,* **h**. *Trachelomonas volvocina,* **i**. *Gymnodinium palustrae,* **j**. *Peridinum aciculiferum,* **k**. *Nitzschia acicularis,* **l**., *Nitzschia archibaldii*

The most specious families are Closteriaceae, Selanatraceae, Hydrodictyaceae followed by Scenedesmaceae, Euglenaceae, Volvocaceae and Coleochaetaceae (Fig. 2).

Discussion

Study on the diversity of phytoplankton from in and around the wetlands of Kolhapur and reported 174 species of phytoplankton, of which 24

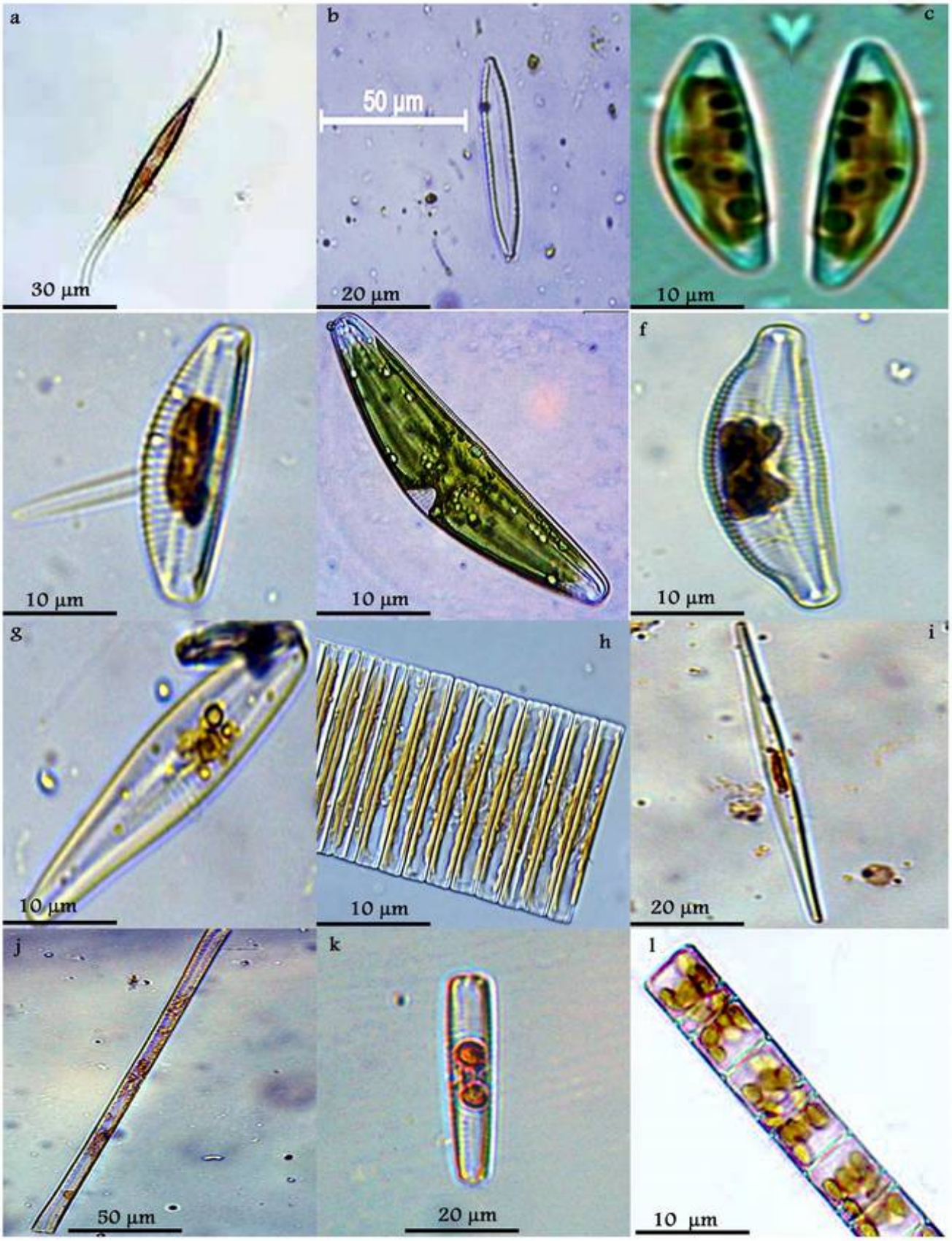

Fig. 9. a. *Nitzschia Closterium,* **b**. *Nitzschia palea,* **c**. *Cymbella affinis*, **d**. *Cymbella helvetica*, **e**. *Cymbella lanceolata,* **f**. *Cymbella tumida*, **g**. *Gomphonema subventricosum,* **h**. *Frustulia saxonica*, **i**. *Synedra acus,* **j**. *Synedra ulna*, **k**. *Licmophora abbreviata,* **l**. *Melosira granulata*

species are filamentous forms and 150 species are of colonial or unicellular forms (10). Another study on the phytoplankton diversity of lakes in Shivaji University, Kolhapur and reported 78 species of phytoplankton belonging to 5 major classes *viz*., Cyanophyceae, Chlorophyceae, Euglenophyceae, Dinophyceae and Bacillariophyceae (17). Reports are there on the impact of anthropogenic activities

on the phytoplankton diversity of Rajaram reservoir, Kolhapur (Maharashtra) (18) that recorded 120 species of phytoplankton belonging to 5 major classes of phytoplankton.

Similar results were recorded during the present investigation and the authors identified 108 species of phytoplankton belonging to 5 major classes *viz*., Cyanophyceae, Chlorophyceae, Euglenophyceae, Dinophyceae and Bacillariophyceae. Amongst these Chlorophyceae (57) and Bacillariophyceae (26) shows maximum diversity followed by Cyanophyceae (13), Euglenophyceae (08) and Dinophyceae (02). Most specious genera are *Pediastrum* (06), *Scenedesmus* (06), *Staurastrum* (06), *Tetraedron* (06) followed by the genera *viz*., *Cosmarium* (04), *Cymbella* (04), *Nitzschia* (04), *Navicula* (04) and *Spirogyra* (04). Authors also stated that the many Cyanophyceae, Chlorophyceae and Bacillariophyceae members (pollution indicators) which were reported earlier from Kolhapur district are not reported from the studied reservoirs (1, 10-11, 13, 17-18). Hence, it indicates the healthy condition of reservoirs.

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Competing Interests

The authors don't have any competing interests.

Authors contributions

AP collected the water samples from the reservoirs of Kolhapur district and microphyte photographs were taken. SP identified the species and written preliminary draft of manuscript. SS confirmed the species and finalise the manuscript.

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